

# Angelantoni Industrie SpA

## Biomedical division

# ***OPERATING***

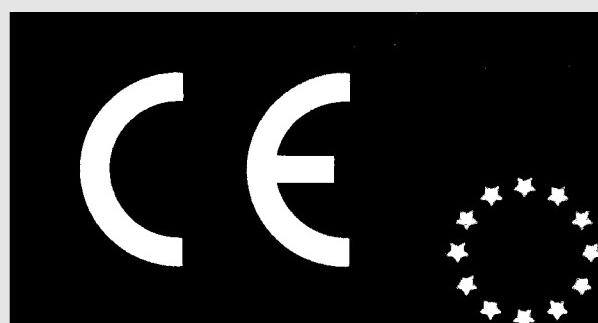
# ***INSTRUCTIONS***

# ***FOR***

# ***REFRIGERATORS***

MODELS DESCRIBED IN THIS MANUAL :

FRL180 V  
FRL180 V-GL  
FRL260 V  
FRL260 V-GL  
FRL360 V  
FRL360 V-GL  
FRL500 V  
FRL500 V-GL



***MARK***

## **WARNING**

**The equipment described hereinafter is not provided for in Annex IV of the European 'Machine Directives'. The procedure set out in Article 8, paragraph 2, letter A of the CEE Directives 89/392 and 91/368 must be therefore applied.**

Article 8, paragraph 2, letter A of the CEE Directives 89/392 and 91/368 obliges the manufacturer to issue the necessary documentation required by the Annex of the above directives and to maintain it in the technical files of Angelantoni Industrie S.p.A. located in loc. Cimacolle, Massa Martana, Perugia (Italy).

## **IMPORTANT**

**The boxes marked with the word ‘WARNING:’ contain important information about safety measures.**

The boxes marked with the word '**Note:**' either contain important pieces of advice on operations to be performed or aim at completing the information contained in the operating instructions.

# TABLE OF CONTENTS

## CHAPTER 1

1)	DATA AND FEATURES OF THE EQUIPMENT .....	5
1.1)	MARKING PLATE DATA.....	5
1.2)	TECHNICAL DATA.....	5
1.2)	FUSES.....	5

## CHAPTER 2

2)	HOW TO USE THE OPERATING INSTRUCTIONS.....	6
2.1)	WHOM THE OPERATING INSTRUCTIONS ARE ADDRESSED TO? .....	6
2.2)	PURPOSES OF THE OPERATING INSTRUCTIONS.....	6
2.3)	LIMITATIONS OF THE OPERATING INSTRUCTIONS .....	6
2.4)	HOW TO KEEP THE OPERATING INSTRUCTIONS .....	6
2.5)	WARNING .....	6

## CHAPTER 3

3)	HANDLING OF THE EQUIPMENT .....	7
3.1)	STATE OF THE EQUIPMENT .....	7
3.2)	PERSONNEL REQUIREMENTS.....	7
3.3)	NECESSARY MEANS FOR HANDLING THE EQUIPMENT .....	7
3.4)	LIFTING INSTRUCTIONS.....	7
3.5)	LIFTING AND HANDLING OF A NON PALLETISED EQUIPMENT BY MEANS OF A FORK-LIFT TRUCK .....	7
3.6)	INSTRUCTIONS FOR HANDLING .....	7
3.7)	FIXING OF THE EQUIPMENT .....	7

## CHAPTER 4

4)	LAY-OUT OF THE EQUIPMENT.....	8
----	-------------------------------	---

## CHAPTER 5

5)	LAY-OUT OF THE EQUIPMENT WITH PACKING .....	9
----	---	---

## CHAPTER 6

6)	NECESSARY OPERATIONS AND MATERIALS FOR INSTALLATION .....	10
6.1)	OPERATING ENVIRONMENT .....	10
6.2)	CONNECTION TO THE ELECTRICAL NETWORK.....	10

## CHAPTER 7

7)	POSITIONING AND INSTALLATION.....	11
7.1)	RECEPTION OF THE EQUIPMENT .....	11
7.2)	SUPPLY AND GROUND CONNECTIONS.....	11
7.2.1)	SUPPLY CABLE .....	11
7.2.2)	GROUND CONNECTION.....	11

## CHAPTER 8

8)	HOW TO USE THE OPERATING INSTRUCTIONS.....	12
8.1)	WHOM THE OPERATING INSTRUCTIONS ARE ADDRESSED TO? .....	12
8.2)	USER .....	12

## CHAPTER 9

9)	TECHNICAL DESCRIPTION OF THE EQUIPMENT .....	12
9.1)	STRUCTURAL DESCRIPTION .....	12
9.2)	COOLING SYSTEM .....	13
9.3)	FUNCTIONING OF THE ELECTRIC SYSTEM.....	13

## CHAPTER 10

10) START-UP AND OPERATION INSTRUCTIONS.....	13
10.1) DESCRIPTION OF THE COMMAND AND CONTROL PANEL.....	13
10.1.1) CONTROL PANEL COMMANDS.....	13
10.2) EXAMPLE OF START-UP .....	14
10.2.1) ELECTRICAL CONNECTION.....	14
10.2.2) EQUIPMENT ON-OFF .....	14
10.2.3) TEMPERATURE SETTING .....	14
10.2.4) ALARM SYSTEM .....	14
10.2.4.1) Alarm system description .....	14
Alarm system functions description .....	15
Conditions alarm warnings description .....	15
Further information .....	15
10.2.5) Alarm system temperature threshold alarm regulation .....	15
10.3) SOME PRECAUTIONS.....	15
10.3.1) INTRODUCTION OF SPECIMENS.....	15
10.4) TEMPERATURE CHART RECORDER .....	16
10.4.1) USE OF THE RECORDER.....	16
Battery clock.....	16
Battery substitution.....	16
Chart disk replacement.....	16
Spring tightened clock.....	16
Spring tighten.....	16
Chart disk replacement.....	16
WRITING.....	16
Writing cartridges .....	16
Writing cartridges replacement .....	16

## CHAPTER 11

11) SERVICING INSTRUCTIONS .....	17
11.1) STRUCTURE CLEAN-UP .....	17
11.1.1) CLEANING OF GASKETS.....	17
11.1.2) AIR CONDENSER CLEAN-UP .....	17
11.2) COOLING SYSTEM .....	17
11.3) ELECTRIC - ELECTRONIC PART.....	17

## CHAPTER 12

12) PROBLEMS AND TROUBLESHOOTING .....	18
--	----

## CHAPTER 13

13) DEMOLITION OF THE EQUIPMENT .....	19
13.1) TYPES OF MATERIAL IN THE EQUIPMENT .....	19

## CHAPTER 14

14) REFRIGERATING DIAGRAM .....	20
---------------------------------	----

## CHAPTER 15

15) WIRING DIAGRAM.....	21
-------------------------	----

## CHAPTER 16

16) HANDLE MOUNTING .....	22
---------------------------	----

# 1) DATA AND FEATURES OF THE EQUIPMENT

## 1.1) MARKING PLATE DATA

**ANGELANTONI Industrie SpA**  
**località Cimacolle**  
**06056 Massa Martana (Perugia)**  
**Italy**  
**Model** : FRL .....  
**Serial Number** : No. ....  
**Test** : No. ....  
**Year of production** : 2000  
**Marking** : CE

Tel. +39.75-8955.1  
Fax +39.75-8955.200

## 1.2) TECHNICAL DATA

Models	FRL180 V	FRL260 V	FRL360 V	FRL500 V
Useful capacity (l)	180	260	360	500
Temperature range	da + 2 °C a + 12 °C	da + 2 °C a + 12 °C	da + 2 °C a + 12 °C	da + 2 °C a + 12 °C
Temperature	+ 4 °C	+ 4 °C	+ 4 °C	+ 4 °C
Precision ( $\pm$ °C) without internal load	2 °C	2 °C	2 °C	2 °C
Supply.	230V +6/-10% 50Hz ; 1+G			
Rating absorb. current.	0,5 A	0,6 A	0,65 A	0,65 A
Medium power.	0,12 kW	0,14 kW	0,15 kW	0,15 kW
Max power	0,15 kW	0,17 kW	0,18 kW	0,18 kW
Energy consumption	1,20 kWh/24h	1,40 kWh/24h	1,60 kWh/24h	1,70 kWh/24h
Heat dissipation	130 kcal/h	130 kcal/h	130 kcal/h	130 kcal/h
Refrigerating gas	R134a	R134a	R134a	R134a
External dimensions (WxDxH).	602 x 600 x 1050 mm	602 x 600 x 1385 mm	602 x 600 x 1759 mm	755 x 715 x 1685 mm
Useful external dimensions (WxDxH).	513 x 433 x 734 mm	513 x 433 x 1047 mm	513 x 433 x 1418 mm	646 x 566 x 1338 mm
Overall weight with standard packing	47 kg	57 kg	67 kg	78 kg
Overall weight without packing	44 kg	54 kg	64 kg	75 kg
Max. noise level	55 dB (A)	58 dB (A)	58 dB (A)	58 dB (A)

Models	FRL180 V-GL	FRL260 V-GL	FRL360 V-GL	FRL500 V-GL
Useful capacity (l)	180	260	360	500
Temperature range	da + 2 °C a + 12 °C	da + 2 °C a + 12 °C	da + 2 °C a + 12 °C	da + 2 °C a + 12 °C
Temperature	+ 4 °C	+ 4 °C	+ 4 °C	+ 4 °C
Precision ( $\pm$ °C) without internal load	2 °C	2 °C	2 °C	2 °C
Supply.	230V +6/-10% 50Hz; 1+G			
Rating absorb. current.	0,6 A	0,65 A	0,8 A	0,8 A
Medium power.	0,14 kW	0,15 kW	0,18 kW	0,18 kW
Max power.	0,17 kW	0,18 kW	0,21 kW	0,21 kW
Energy consumption	1,80 kWh/24h	1,90 kWh/24h	2,10 kWh/24h	2,30 kWh/24h
Heat dissipation	170 kcal/h	170 kcal/h	170 kcal/h	170 kcal/h
Refrigerating gas	R134a	R134a	R134a	R134a
External dimensions (WxDxH).	602 x 600 x 1050 mm	602 x 600 x 1385 mm	602 x 600 x 1759 mm	755 x 715 x 1685 mm
Useful external dimensions (WxDxH).	513 x 433 x 734 mm	513 x 433 x 1047 mm	513 x 433 x 1418 mm	646 x 566 x 1338 mm
Overall weight with standard packing	57 kg	68 kg	83 kg	98 kg
Overall weight without packing	54 kg	65 kg	80 kg	95 kg
Max. noise level	55 dB (A)	58 dB (A)	58 dB (A)	58 dB (A)

**Note:** The standard packaging is made of cardboard or plastic for transport by road and/or by plane. In case of shipping transport, please contact the ANGELANTONI Industrie spa shipping department to know dimensions and weights of the packed equipment.

## 1.2) FUSES.

Models	Value/code
FRL180 V, FRL180 V-GL	6 A / F
FRL260 V, FRL260 V-GL	6 A / F
FRL360 V, FRL360 V-GL	6 A / F
FRL500 V, FRL500 V-GL	6 A / F

## 2) HOW TO USE THE OPERATING INSTRUCTIONS

This chapter describes how to use the operating instructions and their limitations.

### 2.1) WHOM THE OPERATING INSTRUCTIONS ARE ADDRESSED TO?

This guide is addressed to people in charge of:

- transport, loading and unloading, stocking;
- use of the equipment;
- installation;
- servicing.

### 2.2) PURPOSES OF THE OPERATING INSTRUCTIONS

This guide provides information on the intended use, technical features, instructions for the handling, installation, tuning and use of the equipment. It also contains useful addresses where to send any intervention request or any order for materials of consumption (for spare parts please refer to the service manual or contact Angelantoni's technical assistance service).

### 2.3) LIMITATIONS OF THE OPERATING INSTRUCTIONS

Please remember that the operating instructions (hereinafter referred to as **O.I.**) cannot replace an adequate knowledge by the user and must be therefore taken as a reference book for the main operations to be performed. Moreover, it should be noted that the O.I. describe the techniques used at the moment of the equipment's purchase; the manufacturer reserves the right to make all necessary update to the O.I. and products without obligation to replacement of previous ones., particular cases excepted.

### 2.4) HOW TO KEEP THE OPERATING INSTRUCTIONS

The user must keep the O.I. very carefully in order to make them available throughout the equipment's lifetime. For this purpose, the O.I. are supplied in a special bag usually placed on the right side of the equipment, aimed at protecting them against wear-and-tear. Should the O.I. be destroyed or lost, ask for a supplementary copy to your local agent or to the manufacturer directly, specifying the type, model, year of production of the equipment.

### 2.5) WARNING

#### WARNING:

Never perform any operation or movement if you cannot foresee their effects; in case of doubts, please contact the manufacturer or your local agent. The manufacturer cannot be held responsible for damages caused to the equipment, things or persons in case of:

- improper use of the equipment by non authorised personnel;
- incorrect installation;
- improper supply;
- failure to comply with compulsory servicing operations;
- unauthorised modifications or interventions;
- use of spare parts other than original or specific ones for the type of equipment;
- total or partial failure to comply with the instructions;
- exceptional events.

#### Note

The temperature set value is not displayed for that reason to control the temperature please see the digital thermometer after a period of 10 minutes of operating of the system.

### 3) HANDLING OF THE EQUIPMENT

This chapter contains the necessary instructions to load, unload and handle the equipment properly.

#### 3.1) STATE OF THE EQUIPMENT

The equipment is usually delivered inside a special palletised packing. In case of direct consignment by Angelantoni's authorised personnel, the equipment may have no packing.

#### 3.2) PERSONNEL REQUIREMENTS

No particular requirement is needed to handle the equipment (please take into account the type of packing). In any case, it is advisable to let these operations be performed by people acquainted with the use of lifting and transport means.

#### 3.3) NECESSARY MEANS FOR HANDLING THE EQUIPMENT

The equipment can be lifted and handled by means of lifting trucks or any other suitable means whose min. loading capacity equals the weight declared in the technical data sheet (ref. 1.2).

**WARNING:**

Although handling operations are quite easy, it is advisable to check the correct balance of the load.

#### 3.4) LIFTING INSTRUCTIONS.

All new equipment are shipped packed inside special pallets.

The overall weight of equipment and packing is easily readable also from the outside of the packing.

Pallets allow easy slinging for lifting by bridge cranes or by fork-lift trucks.

**WARNING:**

Although handling operations are quite easy, it is advisable to check the correct balance of the load.

#### 3.5) LIFTING AND HANDLING OF A NON PALLETISED EQUIPMENT BY MEANS OF A FORK-LIFT TRUCK

It is strongly recommended to insert the forks of the fork-lift truck correctly in order to avoid the equipment to be damaged.

**WARNING:**

Make sure that the forks of the fork-lift truck do not come directly into contact with the external panels of the equipment as they could damage it.

Never use fork-lift trucks or similar machines on equipment without pallets.

#### 3.6) INSTRUCTIONS FOR HANDLING

The equipment being supported by four feet (no wheels), it is therefore not possible to move it manually.

No particular precaution is needed if the floor in the working area is well levelled.

**WARNING:**

Handle the equipment with suitable means only (fork-lift trucks, etc.).

In case of accidental bumps, please check if there is any damage and, should it be necessary, contact the manufacturer.

In order to avoid that the oil contained into the compressor flows into the cooling circuit, the equipment must be transported, stocked and handled in vertical position only, by carefully observing the indications on the packing: should the equipment be necessarily turned over, please contact Angelantoni's local agent or the manufacturer directly.

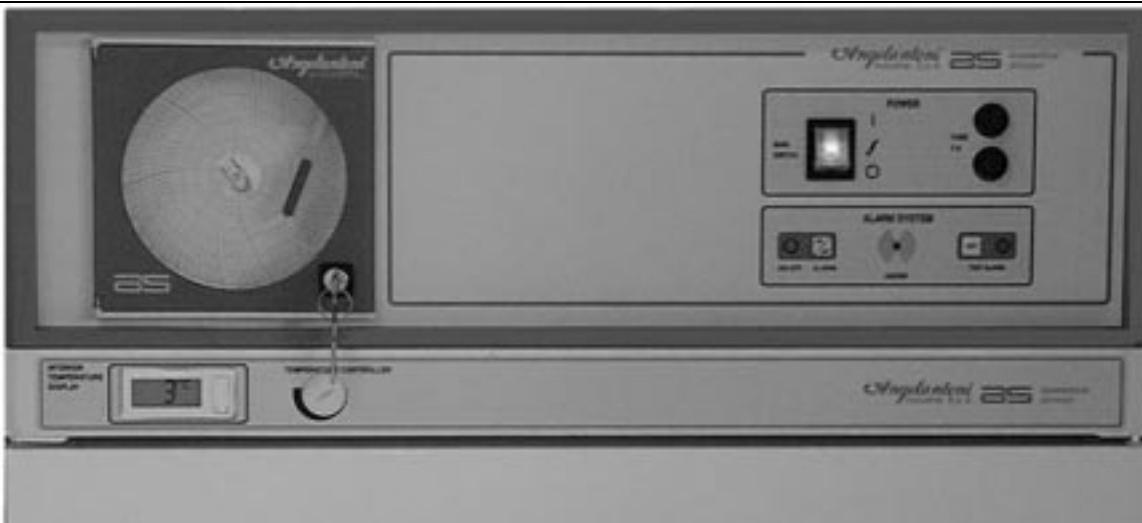
The special wooden base features slots for the introduction of the forks of the fork-lift truck and allows the easy handling and lifting of the equipment with conventional means.

#### 3.7) FIXING OF THE EQUIPMENT

The equipment has been conceived to be operated on horizontal planes.

Under these conditions, no blocking device is needed.

## 4) LAY-OUT OF THE EQUIPMENT



## 5) LAY-OUT OF THE EQUIPMENT WITH PACKING



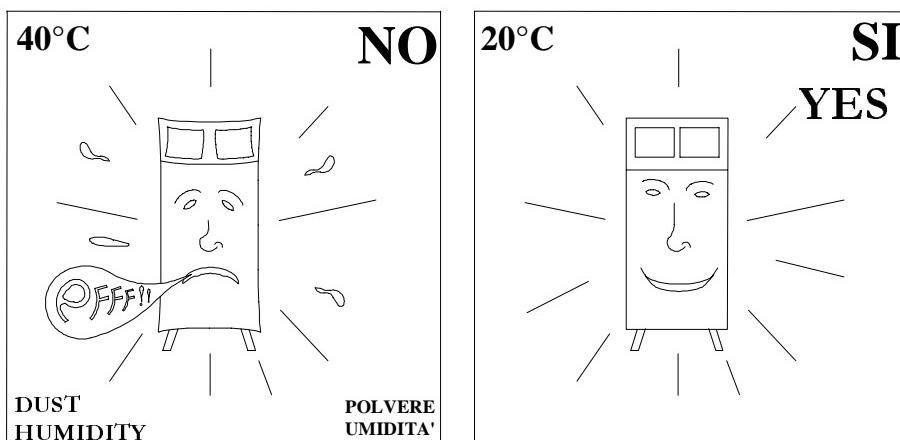
## 6) NECESSARY OPERATIONS AND MATERIALS FOR INSTALLATION

This chapter contains all the necessary instructions for the preparation of the site, means and materials - to be provided by the user - to be followed for a correct installation of the equipment.

### 6.1) OPERATING ENVIRONMENT

To ensure the correct functioning of the equipment, the room where the equipment will be installed should be sufficiently ventilated, have low levels of dust and be kept at an ambient temperature ranging from 10° to 30°C.

When positioning the equipment, always provide the necessary room for easy access to those parts that need servicing.



#### **WARNING:**

The equipment has not been developed to be operated in areas that are classified as dangerous (explosive) by the CEI 64/4 regulations.

The equipment being classified as IP 20 (according to the EN 60010 protection standards, ref. 6.2.2) is not fit for operation outdoors or in places that are not protected against atmospheric agents.

#### **Note:**

Should the user need to place the equipment in places other than those described above, always contact the manufacturer (Angelantoni Industrie S.p.A.) before starting operation.

### 6.2) CONNECTION TO THE ELECTRICAL NETWORK.

#### **WARNING:**

Electrical safety is obtained by properly connecting the equipment to an efficient grounding system in conformity with the safety regulations in force.

Make sure this basic safety requirement is observed and, in case of doubt, ask for a thorough control of the electric system by skilled authorised personnel

#### **WARNING:**

To ensure a correct installation of the equipment in compliance with the safety standards in force, it will be necessary to provide a special omnipolar switch-operated socket whose contact pitch is equal to or higher than 3 mm, complete with fuses and differential switch placed so as to allow easy access.

#### **Note:**

Class 1 insulation, complete with supply cable, without differential switch protection degree  $\leq 0.5$  mA 'THE EQUIPMENT COULD BE A SOURCE OF ELECTRIC DISCHARGE IN THE EVENT OF BREAKDOWN OR INTERRUPTION OF THE PROTECTION CONDUCTOR. THEREFORE, TO IMPROVE SAFETY CONDITIONS, IT COULD BE ALSO INSTALLED (ACCORDING TO THE USER'S REQUIREMENTS) PERMANENTLY' (ref. 6.12.2.1 of CEI/EN 61010-1 regulations).

**WARNING:**

The use of the equipment, as well as the use of any other electrical appliance, implies the strict observance of some basic rules. In particular:

- do not touch the equipment with wet hands or feet;
- do not lay the equipment on floors that are usually wet;
- do not use extensions in bathrooms or washing rooms;
- do not pull the supply cable to disconnect it from the mains.

## 7) POSITIONING AND INSTALLATION

This chapter provides the necessary instructions to connect the different parts of the equipment properly.

### 7.1) RECEPTION OF THE EQUIPMENT

When the equipment is delivered, it is ready to be operated.

**WARNING:**

Before unpacking the equipment, check that it has not been damaged during transport.

In case of damage:

- a) contact your local agent;
- b) issue a written report and enclose, whenever possible, some photos highlighting the damage;
- c) send a copy of the report to:
  - the assurance company of the forwarder
  - the forwarder
  - the manufacturer or local agent.

### 7.2) SUPPLY AND GROUND CONNECTIONS.

All connections to the power mains must be performed by skilled personnel.

**WARNING:**

The equipment must be supplied at a voltage whose value is the same as the one described in the 'Technical data' chapter (ref. 1.2) and on the marking plate.

#### 7.2.1) SUPPLY CABLE.

The supply cable, complete with 16 A plug, must be in compliance with the regulations in force (CEI-EN 61010-1 ref. 6.12.2.2) and connected to a special container with active parts protected against accidental contacts.

**WARNING:**

It is strongly recommended to unroll the supply cable for all its length and check that it is not crushed..

#### 7.2.2) GROUND CONNECTION

When the yellow-green conductor of the supply cable is adequately secured to the plug, it ensures the correct protection of the equipment.

**WARNING:**

Electrical safety is obtained by properly connecting the equipment to an efficient grounding system in conformity with the safety regulations in force.

Make sure this basic safety requirement is observed and, in case of doubt, ask for a thorough control of the electric system by skilled authorised personnel.

## 8) HOW TO USE THE OPERATING INSTRUCTIONS

This chapter describes how to use the operating instructions and their limitations.

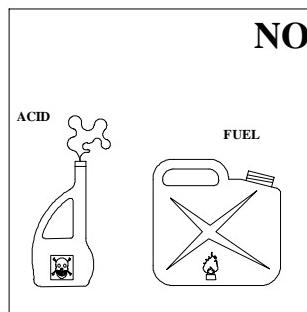
### 8.1) WHOM THE OPERATING INSTRUCTIONS ARE ADDRESSED TO?

The equipment described in these operating instructions is a monolithic refrigerators, especially developed for preservation of vaccines and others materials generally located in research laboratories.

#### WARNING:

This series of equipment must not contain:

- flammable and/or explosive solid or liquid materials;
- solid or liquid materials that during evaporation or sublimation may produce flammable gases;
- solid or liquid materials containing chemically aggressive substances;
- solid or liquid materials that during evaporation or sublimation may produce aggressive vapours.



#### Note:

If the user wants to store products other than those listed above and whose physical nature is unknown, please contact the manufacturer (Angelantoni Industrie) before using them.

### 8.2) USER

No particular technical knowledge is required to operate the equipment. A careful reading of these operating instructions is however necessary. In any case, it should be remembered that experience and the knowledge of the product to be treated are important factors to be taken into due account for safe operation.

## 9) TECHNICAL DESCRIPTION OF THE EQUIPMENT

This chapter will briefly describe the functioning of the equipment and will provide the user and the persons in charge of servicing with all the necessary instructions to better understand what is meant by correct functioning of the equipment and for a fast detection of failures or troubles.

### 9.1) STRUCTURAL DESCRIPTION

**Structure.** The structure is fully metallic and made of painted steely plate.

The door is made of anodized aluminium profile and anti-condensing glass.

Into the structure are placed extractable drawers mounted on stainless steel telescopic guides.

**Insulation.** Obtained by injection of polyurethane foam (40 kg/m<sup>3</sup>).

**Cooling system.**

Completely sealed, this system features a silent hermetically-sealed compressor, a static condenser and a ventilated painted aluminium evaporator.

**Electric system.**

IP 20 protection class, consisting of a control panel with electromechanical regulator, a thermometer with digital display for parameter reading, an alarm system of the last generation and a graphic recorder for temperature recording.

## 9.2) COOLING SYSTEM

Refrigeration is obtained by the evaporation of the fluid injected into an evaporator and then in the gaseous state sucked by the compressor. Afterwards, the compressor is used to compress the gas (refrigerating gas) inside the condenser; due to high pressure and refrigeration the gas turns into a liquid substance.

This fluid expands thanks to a thermostatic valve and while evaporating, it absorbs heat and induces refrigeration. The cycle ends when the gas is sucked up again by the compressor.

## 9.3) FUNCTIONING OF THE ELECTRIC SYSTEM.

The control panel consists of a electromechanical regulator for temperature regulation and the visualisation is made by a thermometer with digital display for parameter reading.

The alarm system (completely free from the others control systems) is fully described in the paragraph (10.2.4).

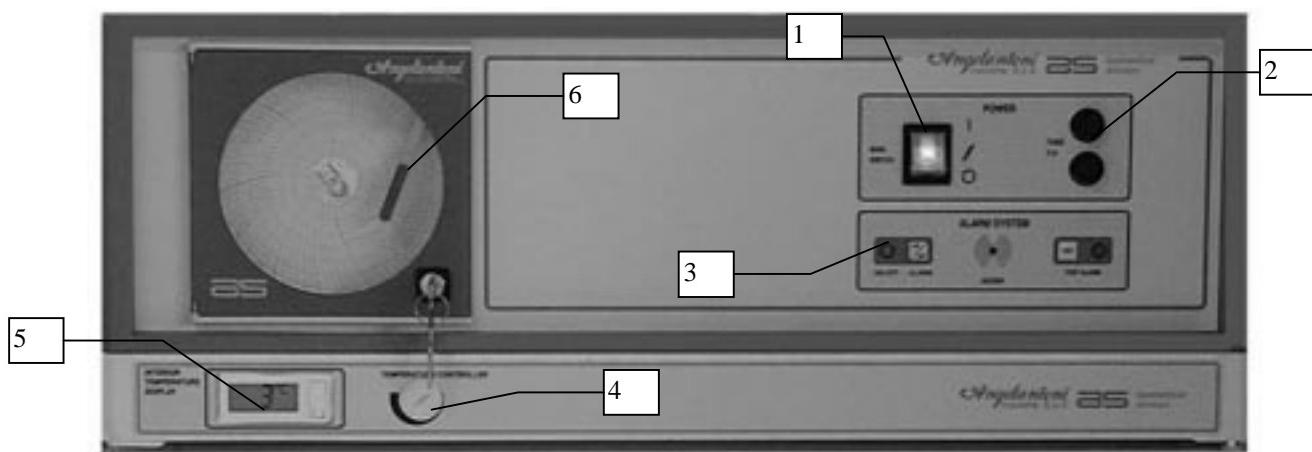
**Note:**

The command section will be described in details in the 'Operation and use instructions' chapter.

# 10) START-UP AND OPERATION INSTRUCTIONS

This chapter provides useful information about the preliminary steps to be performed for a correct start-up and operation of the equipment.

## 10.1) DESCRIPTION OF THE COMMAND AND CONTROL PANEL



- 1) Main switch.
- 2) Line fuses.
- 3) Alarm system (accessory).
- 4) Temperature controller thermostat.
- 5) Digital display thermometer.
- 6) Graphic recorder (accessory).

### 10.1.1) CONTROL PANEL COMMANDS.

**Note:**

For all following references see (ref. 10.1).

**MAIN SWITCH:** (ref.1) Connected to the supply give voltage to the equipment.

**LINE FUSES:** (ref. 2) Protect the equipment from anomalous electrical absorbing.

**ALARM SYSTEM:** (ref.3) Control the alarm system of the equipment.

**TEMPERATURE CONTROLLER THERMOSTAT:** (ref.4) Control the temperature of the equipment.

**DIGITAL DISPLAY THERMOMETER:** (ref.5) Display the internal temperature value.

**GRAPHIC RECORDER:** (ref.6) allows to record the internal temperature value on paper.

## 10.2) EXAMPLE OF START-UP.

Taking into due consideration the operations and warnings described in the previous chapters, start the equipment up.

### 10.2.1) ELECTRICAL CONNECTION.

Plug in the pin into the apposite power supply socket.

**Note:** See ref. 7.2.

### 10.2.2) EQUIPMENT ON-OFF.

**Note:**

For all following references, please refer to (10.1).

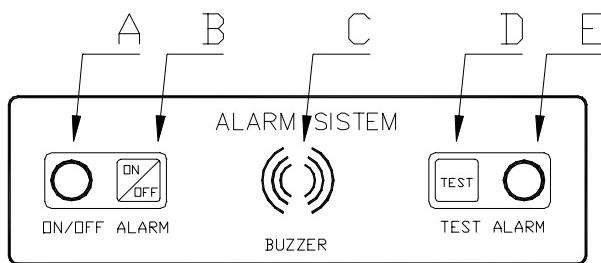
The equipment is switched on and switched off by means of the main switch (ref. 1).

### 10.2.3) TEMPERATURE SETTING.

To change the operating temperature of the equipment turn the knob (ref.4).

**Note:** The set temperature value is not displayed, therefore for the control you must read the digital thermometer after 10 minutes approx. of operating.

### 10.2.4) ALARM SYSTEM.



#### 10.2.4.1) Alarm system description.

The alarm system that monitors the chamber temperature and warns when the temperature exceeds the set limits, is also able to control other parameters, as like as voltage and buffer battery charge level.

As shown in the above figure, the system has two push-buttons, two leds and one buzzer.

In temperature alarm condition the buzzer (ref. 3) and the red led (ref. 5) operate, after about 5 seconds also the contact that transfers the remote alarm closes; the connections of this one are placed in the rear of the equipment, see (chapter 7.1.1, ref. 3 of the figure).

The buffer battery has an automatic recharge system.

### **Alarm system functions description.**

- 1) – Switching on: Push the “ON/OFF” key and in the same time the “TEST” key (ref. 2 and 4), the green led (ref. 1) will light on for warning.
- 2) – Switching off: Repeat the operation of the 1 point.
- 3) – Alarm operation control: Pushing the “TEST” pushbutton (ref. 4).
- 4) – Control of the level of the battery charge: Push the “TEST” pushbutton (ref. 4) for more than 5 seconds.
- 5) – Remote alarm operation control: Push the “TEST” pushbutton (ref. 4) for more than 10 seconds.
- 6) – Alarm reset: If you are sure that the temperature is out the set up values, switch off the system and do what it must be done; if you are not sure that the temperature is out the set up values, switch off the system and switch on it straight away, if the alarm is still present it is sure that there is a trouble condition.

### **Conditions alarm warnings description.**

- 1) – Temperature alarm: The buzzer sounds (ref. 3) with an intermittent signal, BEEP + pause, the red led (ref. 5) blinks and also the contact that transfers the remote alarm closes after about 10 seconds.
- 2) – Alarm of absence voltage: The buzzer sounds (ref. 3) with an intermittent signal, 2 BEEP + pause, the red led (ref. 5) blinks, the contact that transfers the remote alarm does not close. If the power supply should not return, when the battery reaches a too low level of voltage, the buzzer sounds in continuous mode for a short time then the system closes itself to avoid the damage of its battery.
- 3) – Warnings in TEST BATTERY condition: The power supply is taken off automatically, the green led (ref. 2) blinks fast and the buzzer sounds 2 BEEP and a pause. If within 60 seconds, the battery does not reach the minimum voltage value “5.4V” the system operates in normal mode otherwise the buzzer sounds continuously until the “TEST” key (ref. 4) is pressed a new time.

### **Further information.**

In case of breaking of the battery the system closes and does not restart.

In case of starting with batteries very discharged it will be an initial BEEP.

In case of starting with broken batteries, the system starts and closes after suddenly.

The batteries charge only if the system is started.

The system starts only if power supply and batteries not broken are present.

If the battery is connected with inverted polarity the system is not damaged because it has got a protection but it not switch on.

The battery charger is protected from short-circuit.

If the system is supplied with direct current, the circuit is protected from eventual polarity inversion.

Power supply; from 10.6 Vdc to 38 Vdc or from 12 Vac to 25 Vac.

**Note:** The alarm system is supplied by a buffer battery that in absence of voltage is able to run it for about 12 hours; the battery charges itself automatically when the power supply returns.

### **10.2.5) Alarm system temperature threshold alarm regulation**

The above-mentioned alarm threshold are previously factory pre-set.

## **10.3) SOME PRECAUTIONS.**

### **10.3.1) INTRODUCTION OF SPECIMENS**

Cooling is obtained through forced air circulation.

Do not obstruct the air outlet and do not block the fan; please also remember to leave some space between stocked materials.

Place the bags into the refrigerating room any at a time after the temperature is stabilised.

## 10.4) TEMPERATURE CHART RECORDER.

Freezers can be supplied with a temperature chart recorder upon customer request. Normally it is supplied a 7-day battery-operated recorder, complete with a clock supplied at 1.5 V by a high-capacity (6 months approx.) accumulator. The temperature chart recorder is moreover supplied complete with no. 1 printing cartridge and no. 55 chart disks ensuring 1-year coverage. Contact Angelantoni's Assistance Service for additional printing cartridges and chart disks.

### 10.4.1) USE OF THE RECORDER

#### Battery clock.

(see Fig. 1)

#### Battery substitution.

Extract the chart disc as shown in paragraph 10.7.1.1.2. Insert the 1.5V battery.

#### Chart disk replacement

- Lift the pen (4).
- Move the lock (1) in the direction shown by the arrow and lift it.
- Remove the chart disk.
- Install the new chart disk in the central pin.
- Move the lock (1) to the previous position and lower the pen (4).

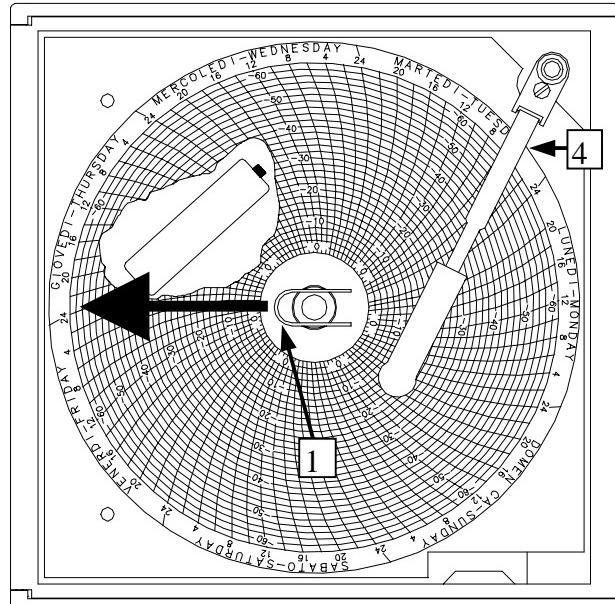


Fig. 1

#### Spring tightened clock.

(optional; see Fig. 2)

#### Spring tighten.

Turn the knurled knob (1) counterclockwise until the unit has completely been charged

#### Chart disk replacement

- Lift the pen (4).
- Completely unscrew the knurled knob (1) clockwise.
- Remove the chart disk.
- Install the new chart disk in the central pin.
- Fasten the knurled knob (1) and lower the pen (4).

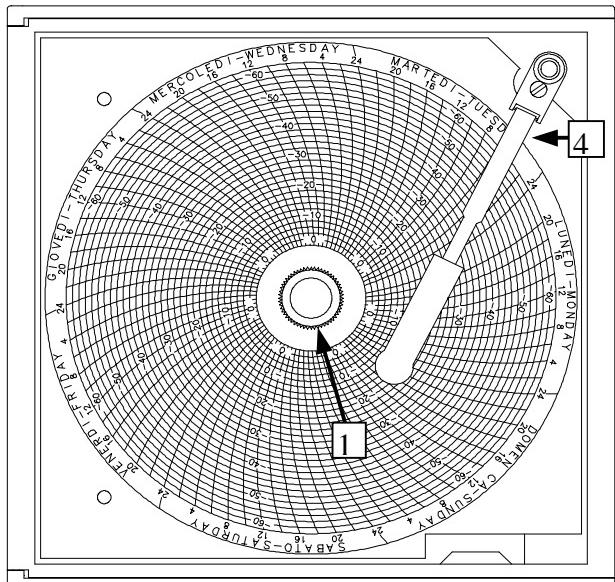
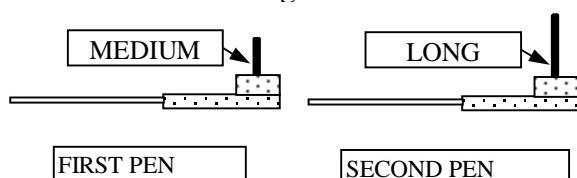


Fig. 2



**Note:** To order the nib, please specify the code as indicated in the following table. To order chart disks, please specify the code printed on them.

RECORDER TYPE	COLOURS	
	FIRST PEN	SECOND PEN
SINGLE PEN	BLUE MEDIUM code no. 133962	
TWO PENS	RED MEDIUM code no. 133969	BLUE LONG code no. 133968

## 11) SERVICING INSTRUCTIONS

This chapter must be read very carefully since the instructions stated herein are mandatory in order not to determine risky conditions for people, animals, things and to ensure the utmost safety and reliability of the equipment over time.

**WARNING:** Disconnect the electric supply cable from the mains before starting any servicing operation.

### 11.1) STRUCTURE CLEAN-UP

Remove the drawers.

Clean with a wet cloth soaked in neutral detergent and then rinse with another cloth soaked in water.

Re-insert the drawers.

**WARNING:** Never spray water directly on any part of the equipment since the electric insulation could be seriously damaged and cause malfunctioning.

#### 11.1.1) CLEANING OF GASKETS.

Dirt deposits on doors' gaskets may compromise their functionality.

Clean the gaskets with a cloth soaked in neutral detergent and then rinse with another cloth soaked in water.

#### 11.1.2) AIR CONDENSER CLEAN-UP.

To allow the correct air circulation, clean every 6 months the air condenser from dust deposits by means of soft brushes or compressed air jets.

**Note:** Do not bend the aluminium blades of the condenser.

### 11.2) COOLING SYSTEM.

Each chamber is equipped with a sealed cooling system and therefore no refrigerating substances need to be added (if no accidental leakage occurs). It is however advisable to have the system checked by a skilled technician every year.

### 11.3) ELECTRIC - ELECTRONIC PART.

The command and control electronics consists of an integrated systems placed into an unique box and very simply and extremely reliable therefore no servicing intervention is therefore required.

It is advisable, however, to have the system checked by authorised technicians once a year to verify the correct functioning of the alarm system, the linearity of the displayed temperature value.

**Note:** Checks or interventions by skilled personnel may be required to our 'TECHNICAL ASSISTANCE SERVICE' upon subscription to economic assistance contracts.

## 12) PROBLEMS AND TROUBLESHOOTING

This chapter describes some troubles that may occur while operating the equipment. The following tables provide some useful suggestions on causes and remedies that will help the user solve the most common troubles.

**WARNING:**

The servicing operations authorised by ANGELANTONI Industrie SpA are described in the “Ordinary servicing” chapter. The instructions given in the following tables under the heading ‘REMEDIES’ do not entitle the user to perform any intervention if they may seriously compromise the safety of the equipment. They are only aimed at helping skilled authorised technicians when trying to detect possible failures.

PROBLEM	CAUSE	REMEDIES
The equipment does not start.	Lack of supply voltage.  General switch onto OFF.  Supply plug disconnected from the mains socket .  For causes other than the ones listed above..	Check and, in the affirmative, take steps.  Turn the general switch ON.  Check that the plug is properly connected to the mains socket.  Call the technical assistance service.
The equipment does not reach the set temperature.	The test compartment contain too much material.  The door is not well closed.  Malfunctioning of the regulation system.  Malfunctioning of the cooling system.	Reduce quantity.  Close the door.  Call the technical assistance service.  Call the technical assistance service.
The equipment is too noisy.	The equipment is not evenly laid on the floor.  Contact with foreign bodies.  Damaged mechanical parts.	Remove the cause.  Check that foreign bodies such as boxes or other structures do not come into contact with the equipment so as to avoid vibrations during functioning.  Check that moving mechanical parts such as fans are not sources of noise.

**Note**

If the above remedies cannot solve the problem, please contact Angelantoni ‘TECHNICAL ASSISTANCE SERVICE’.

## 13) DEMOLITION OF THE EQUIPMENT

This chapter provides all necessary instructions for the correct treatment of the demolition materials.

### 13.1) TYPES OF MATERIAL IN THE EQUIPMENT

The equipment consists of the following materials:

- 1 Plastificated zinc plate (structure)
- 2 Polyurethane (thermal insulation)
- 3 Galvanised steel (support, feet)
- 4 Painted steel (compressors)
- 5 Copper (pipes - condenser - evaporator)
- 6 Aluminium (control panel - fans - evaporator - condenser)
- 7 Polycarbonate (control panel)
- 8 PVC (electronic box)
- 9 Refrigerating gases
- 10 Unfreezable oil
- 11 Various material

Some of the above listed demolition materials such as copper, plate and aluminium are easily disposed of whereas some others such as polyurethane, oil, refrigerating gases must be disposed of by specialised companies.

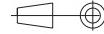
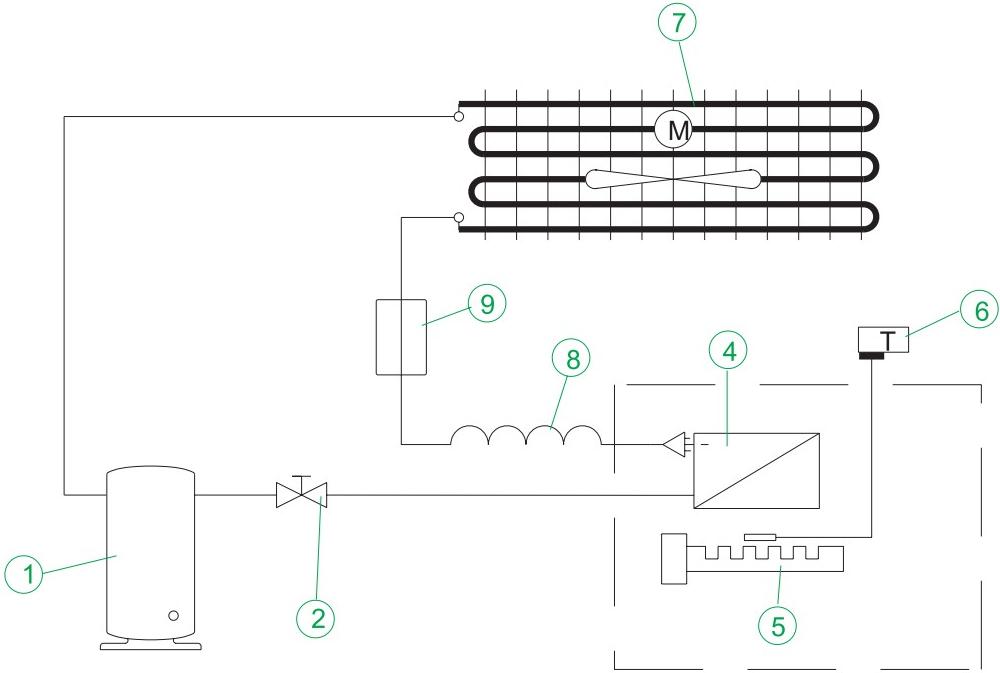
The equipment does not contain any toxic or flammable materials that could produce dangerous conditions during demolition.

**WARNING:**

- Do not waste the compressor's unfreezable oil in the environment.
- Do not waste refrigerating substances in the environment.
- Do not waste polyurethane in the environment.

**It would be advisable to contact specialised companies for the disposal of and the recycling of the above materials.**

# 14) REFRIGERATING DIAGRAM.

 <b>Angelantoni</b> Industrial S.p.A. <i>biomedical division</i>		<b>DISEGN.</b> Draw by <b>M.P.</b> <b>CONTROLLATO</b> <i>Inspected</i> <b>APPROVATO</b> <i>Approved</i> 	<b>OGGETTO Object:</b> REFRIGERATING SCHEMA CAPILLARY CIRCUIT HERMETICALLY SEALED COMPRESSOR, AIR CONDENSER  <small>A TUTTI I DODIMINI DI LEGGE CI RISERVIAMO LA PROPRIETÀ DI QUESTO DISEGNO CON DIVETTO DI RIPRODURLO O DI RENDERLO COMUNQUE NOTO A TERZI SENZA LA NOSTRA AUTORIZZAZIONE.</small> <small>AS BY LAW ENACTED WE RESERVE THE RIGHT OF OWNERSHIP OF DRAWING THE DOCUMENT AND INFORMATION CONTAINED HEREIN MAY NOT BE COPIED, USED OR DISCLOSED WITHOUT OUR PERMISSION.</small> <small>SE NON DIVARSIAMENTE SPECIFICATO TUTTE LE DIMENSIONI SONO IN mm UNLESS NOTED OTHERWISE DIMENSIONS IN mm</small>			<b>N.D.S.</b> Drg N° <b>S-F 2206</b> <b>REVISIONE</b> Revision <b>A</b> <b>SCALA</b> Scale <b>F.S.</b> <b>DATA</b> date <b>21/11/94</b>  <b>ASS.SUPER./Sup. Assembly</b> <b>USATO/Used</b>																																		
<b>REVISIONE</b> Revision <b>A</b> <b>DATA</b> Date <b>21/11/94</b> <b>FIRMA</b> Signature <b>A.L.</b>	<b>DESCRIZIONE/Description</b> <b>EMISSIONE</b>	<small>- TOLLERANZE -          LAVORAZIONI MECCANICHE:          - ALBERI ..... h          - VOLANT ..... h          - ALTRE QUOTE „Js“</small> <small>UNI 6388 UNI 6390</small>  <small>-TOLERANCES-          WORK MACHINING:          - SHAFTS ..... h          - DISC ..... h          - OTHER DIMENSIONS „Js“</small> <small>UNI 6388 UNI 6390</small>			<b>S.D.A.</b> <b>DATA</b> Date <b>.....</b> <b>APPROVATO C.Q.</b> <i>Q.C. APPROVED</i> <b>A.L.</b> <b>FIRMA</b> Signature <b>.....</b>																																			
																																								
<table border="1" style="width: 100%; border-collapse: collapse;"> <tr> <td style="width: 15%;">9</td> <td style="width: 85%;"><u><b>DRIER FILTER</b></u></td> <td style="width: 15%;">1</td> <td style="width: 85%;"></td> </tr> <tr> <td>8</td> <td><u><b>CAPILLARY PIPE</b></u></td> <td>1</td> <td></td> </tr> <tr> <td>7</td> <td><u><b>AIR CONDENSER</b></u></td> <td>1</td> <td></td> </tr> <tr> <td>6</td> <td><u><b>DEFROST. SAFET. THERM.</b></u></td> <td>1</td> <td></td> </tr> <tr> <td>5</td> <td><u><b>HEATERS</b></u></td> <td>1</td> <td></td> </tr> <tr> <td>4</td> <td><u><b>EVAPORATOR</b></u></td> <td>1</td> <td></td> </tr> <tr> <td>2</td> <td><u><b>VALVE</b></u></td> <td>1</td> <td></td> </tr> <tr> <td>1</td> <td><u><b>COMPRESSOR</b></u></td> <td>1</td> <td></td> </tr> <tr> <td colspan="2"><b>POSIZIONE</b> <b>position</b></td> <td><b>DENOMINAZIONE</b> <b>denomination</b></td> <td><b>QUANTITA'</b> <b>quantity</b></td> <td><b>MATERIALI</b> <b>MATERIALS</b></td> <td><b>DIMENSIONI</b> <b>dimensions</b></td> <td><b>NOTE/DISEGNI</b> <b>notes/drawings</b></td> </tr> </table>		9	<u><b>DRIER FILTER</b></u>	1		8	<u><b>CAPILLARY PIPE</b></u>	1		7	<u><b>AIR CONDENSER</b></u>	1		6	<u><b>DEFROST. SAFET. THERM.</b></u>	1		5	<u><b>HEATERS</b></u>	1		4	<u><b>EVAPORATOR</b></u>	1		2	<u><b>VALVE</b></u>	1		1	<u><b>COMPRESSOR</b></u>	1		<b>POSIZIONE</b> <b>position</b>		<b>DENOMINAZIONE</b> <b>denomination</b>	<b>QUANTITA'</b> <b>quantity</b>	<b>MATERIALI</b> <b>MATERIALS</b>	<b>DIMENSIONI</b> <b>dimensions</b>	<b>NOTE/DISEGNI</b> <b>notes/drawings</b>
9	<u><b>DRIER FILTER</b></u>	1																																						
8	<u><b>CAPILLARY PIPE</b></u>	1																																						
7	<u><b>AIR CONDENSER</b></u>	1																																						
6	<u><b>DEFROST. SAFET. THERM.</b></u>	1																																						
5	<u><b>HEATERS</b></u>	1																																						
4	<u><b>EVAPORATOR</b></u>	1																																						
2	<u><b>VALVE</b></u>	1																																						
1	<u><b>COMPRESSOR</b></u>	1																																						
<b>POSIZIONE</b> <b>position</b>		<b>DENOMINAZIONE</b> <b>denomination</b>	<b>QUANTITA'</b> <b>quantity</b>	<b>MATERIALI</b> <b>MATERIALS</b>	<b>DIMENSIONI</b> <b>dimensions</b>	<b>NOTE/DISEGNI</b> <b>notes/drawings</b>																																		

1	2	3	4	5	6	7																								
A			REVISIONE Revision A 12/06/94 M.P.	DATA Date 08/03/99	FIRMA Signature 	DESCRIZIONE/Description EMISSIONE																								
B																														
C																														
D																														
E																														
F																														
<p><b>1 = COMPRESSOR</b>  <b>2 = MOTOR PROTECTION</b>  <b>3 = TEMPERATURE SENSOR</b>  <b>5 = THERMOSTAT</b>  <b>6 = COMPRESSOR FAN</b>  <b>7 = INTERNAL FAN</b></p> <p><b>ALIMENTAZIONE</b></p>				<p><b>ALARM SYSTEM</b></p> <p>TEST-AL ON/OFF LED-MCU LED-L GND +Vcc</p> <p>CONN. 1 COM/SIGN</p> <p>AL.NO-DST. AL.NC-DST. ALC-DST. IN AC IN DC IN AC/DC*</p> <p>CONN. 2 POWER</p> <p>MAX.TEMP1 MAX.TEMP2</p> <p>CONN. 3 TERMOST.</p> <p>CONN. 4 BATT.</p> <p>BATT. 6V</p> <p>AL1-A 05/98</p>																										
<table border="1" style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th>POSIZIONE position</th> <th>DENOMINAZIONE denomination</th> <th>QUANTITÀ quantity</th> <th>MATERIALI materials</th> <th>DIMENSIONI dimensions</th> <th>NOTE/DISSENI O CODICI notes/drawings or codes</th> </tr> </thead> <tbody> <tr> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> </tr> <tr> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> </tr> <tr> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> </tr> </tbody> </table> <p>OGGETTO Object: ELECTRICAL SCHEMIA</p> <p>DIS./Draw by: M.P.</p> <p>CONTROLLATO Inspected</p> <p>APPROVATO Approved</p> <p>MATERIALE Material</p> <p>DATA/ date: 08/03/99</p> <p>SCALA/ scale: F.S.</p> <p>N DIS. Drg N°: S.E. 2756</p> <p>REVISIONE/Revision: A</p> <p>FOGLIO sheet: 1 of 1</p> <p><b>Angelantoni</b> Industrie S.p.A.  biomedical division</p>							POSIZIONE position	DENOMINAZIONE denomination	QUANTITÀ quantity	MATERIALI materials	DIMENSIONI dimensions	NOTE/DISSENI O CODICI notes/drawings or codes																		
POSIZIONE position	DENOMINAZIONE denomination	QUANTITÀ quantity	MATERIALI materials	DIMENSIONI dimensions	NOTE/DISSENI O CODICI notes/drawings or codes																									

## 16) HANDLE MOUNTING.

In order to reduce the packing volume the handle is not fitted as standard on this appliance. May we ask you to fit the handle to the door of this appliance yourself.

